



Project Delivery Network

Structure Hydraulics Design QC Checklist

Version
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QC Manager:
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Introduction

The Project Delivery Network Structure Hydraulics QC Checklist is to be used with the UDOT QC/QA Procedure. This checklist is a tool to assist the project team in verifying all work is produced with due diligence, using acceptable industry standard techniques, available resources and data, and reasonable decisions by competent professionals. The checklist is a tool for the delivery of quality documents and cannot replace the sound judgment and experience of competent professionals. It is the Design Team's responsibility to verify the quality of project documents **before** distribution.

Checklist Instructions

For each deliverable listed, the QC Checker is to verify all items listed in the checklist are complete, along with any additional items the QC Checker deems necessary. The checklist items are not to be interpreted as the only items that need to be verified.

Once all items are verified, the QC Checker is to sign the associated cover sheet and upload it onto ProjectWise. The QC is not complete until the cover sheet is signed, dated, and uploaded onto ProjectWise. See the Project Delivery Network QC/QA Procedure for the appropriate cover sheet.

QC reviews are to be completed **before** distribution.

The following explanations are to aid in completing the QC checklist items:

- A checklist item deemed "complete", "correct", or "accurate" does not denote that the item is perfect, but rather that the item satisfies design criteria based on known information, acceptable techniques, and sound judgment."
- A checklist item deemed "addressed" denotes the item as "reviewed all known concerns and verified the concerns are appropriately mitigated and satisfy design criteria." Addressed concerns are not necessarily incorporated into the design, but satisfactorily mitigated.
- A checklist item deemed "identified" denotes the item as "an acceptable and economical approach to satisfy design criteria based on known information."
- A checklist item deemed "verified" denotes the item as "verified the approach/conclusion as acceptable based on known information."
- Use the check boxes to verify the checklist items are complete. If a checklist item is *not applicable* to the current project, place an NA over the check box to denote the item as not applicable. This will allow the quality assurance to verify all items were addressed.
- Use the comment sections of the Cover Sheets to address exceptions, assumptions, and unique aspects of the project. The comments will help others understand why certain decisions were made and their impacts on the project.

2H1 Develop Initial Structure Hydraulics (For Major Structures)

Develop preliminary structure hydraulics.

References

1. [Drainage Manual of Instruction](#)
 2. [UDOT Project Delivery Network](#)
 3. [UDOT QC/QA Procedures](#)
 4. [Estimate Review Checklist](#)
 5. [UDOT Practical Design Guide](#)
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Draft Structure Hydraulics Report

1. ☐ The preliminary hydraulic analysis conclusion meets drainage design criteria, design standards, and project requirements.
 - a. ☐ Hydrologic methodology is appropriate.
 - b. ☐ Initial structures geometry was accurately evaluated.
 - c. ☐ The preliminary bridge type and span was evaluated.
 - d. ☐ Existing scour history was accurately evaluated.
 - e. ☐ FEMA Flood Mapping is included.
 - f. ☐ Debris flow was considered.
 2. ☐ The draft Structure Hydraulics Report contains all necessary information, including the following:
 - a. ☐ Preliminary hydraulic section
 - b. ☐ Preliminary scour depth
 - c. ☐ Preliminary water surface elevations
 - d. ☐ Preliminary velocities
 - e. ☐ Preliminary low chord
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Preliminary Structure Hydraulics Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

4H1 Complete Structure Hydraulics Design

Complete structure hydraulics design and report.

References

1. [Drainage Manual of Instruction](#)
 2. [UDOT Project Delivery Network](#)
 3. [UDOT QC/QA Procedures](#)
 4. [Estimate Review Checklist](#)
 5. [UDOT Practical Design Guide](#)
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Draft Structure Hydraulics Report

1. ☐ All review comments are addressed and the comment resolutions sent to the Design Leader.
 2. ☐ All revisions meet design and project requirements.
 3. ☐ Structures hydraulic design meets design and project requirements.
 - a. ☐ Recurrence interval breakout includes the Q_{design} , Q_{100} and Q_{500} analysis flows
 - b. ☐ Design storm frequency per table 3.1 is analyzed correctly (D-MOI)
 - c. ☐ The preliminary channel analysis was conducted using existing and proposed bridge/culvert geometry Q_{existing} , Q_{design} , Q_{100} , and Q_{500}
 - d. ☐ Adequate freeboard (≥ 2 feet) is provided for debris passage
 - e. ☐ Appropriate analysis of the backwater for increase and/or damage for existing and proposed conditions
 - f. ☐ The design does not increase FEMA flood elevation
 - g. ☐ Non-FEMA locations do not increase the backwater elevation by more than 1'
 - h. ☐ The hydraulic profile is deemed suitable by both the hydraulics and structures design teams
 4. ☐ Scour protection/remediation measures meet design and project requirements.
 - a. ☐ Foundation depth reflects total scour depth for Q_{100}
 - b. ☐ Bank scour mitigation measures
 - c. ☐ Final design was reviewed by using the 500 year check flood to determine the bridge stability
 - d. ☐ Stream alterations/restorations
 5. ☐ The Structure Hydraulics Report contains all required information and is ready for distribution.
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Structure Hydraulics Cost Estimate

1. ☐ The cost estimate was verified using the Estimate Review Checklist (found at the end of this document).

Estimate Review Checklist

Provide review checklist of all design cost estimates.

References

1. [Estimating – Roadway Design Manual of Instruction](#)
 2. [Estimator's Corner Website](#)
 3. [UDOT Project Delivery Network](#)
 4. Project Development Business System
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Estimate (applies to every stage for updating the estimate)

1. ☐ All necessary bid items are included.
2. ☐ All quantities and units are correct.
3. ☐ All standard bid items match UDOT standard bid items exactly.
4. ☐ Unit prices were estimated using UDOT approved methods (PDBS, local contractors, etc.).
5. ☐ All unit price estimates are documented.
6. ☐ Unit prices reflect the following: (1)
 - a. ☐ Location
 - b. ☐ Time of year of advertisement
 - c. ☐ Complexity of constructability
 - d. ☐ Quantity of item
 - e. ☐ Limitations of operation
 - f. ☐ Current bidding environment
 - g. ☐ Availability of materials
 - h. ☐ Familiarity of a process
 - i. ☐ Specialty equipment
 - j. ☐ Risk to contractor
 - k. ☐ Inflation
 - l. ☐ Construction schedule
7. ☐ Lump sum bid prices are used only when appropriate (i.e. unit pricing is too difficult).
8. ☐ All lump sum bid prices considered the following:
 - a. ☐ Contractor risk due to unknown quantity.
 - b. ☐ Difficulty in making it a unit price pay item.

Additional PS&E Estimate

9. ☐ All bid items, quantities, and units match the plan sheet callouts, summary sheets, and M&P exactly.